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CONSTRUCTION QUALITY ASSURANCE PLAN
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

Montgomery Watson File No. 1252042

Prepared For:
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MONTGOMERY WATSON

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FIGURES

- Figure 1 Remedial Components
Figure 2 Project Organization Chart

ACRONYMS

ACS, Inc.	American Chemical Service, Inc.
BWES	barrier wall extraction system
CQA	construction quality assurance
CQAP	construction quality assurance plan
CQC	construction quality control
FS	Feasibility Study
FML	Flexible Membrane Liner
GWTP	groundwater treatment plant
HDPE	high density polyethylene
HSC	health and safety coordinator
IAS	in-situ air sparging
IDEM	Indiana Department of Environmental Management
ISVE	in-situ soil vapor extraction
K-P	Kapica-Pazmey
MNA	monitored natural attenuation
O&M	operation and maintenance
OFCA	Off-Site Containment Area
ONCA	On-Site Containment Area
OSO	on-site safety officer
PCB	polychlorinated biphenyls
PGCS	perimeter groundwater containment system
ppm	parts per million
PSVP	Performance Standard Verification Plan
QC	quality control
RA	remedial action
RD	remedial design
RI	remedial investigation
RPM	remedial project manager
ROD	Record of Decision
SBPA	Still Bottoms Pond Area
SSP	site safety plan
SOW	Statement of Work
SVOC	semi volatile organic compounds
TSCA	Toxic Substances Control Act
U.S. EPA	United States Environmental Protection Agency
VFPE	very flexible polyethylene
VOC	volatile organic compounds
UAO	unilateral administrative order
USCS	Unified Soil Classification System

1.0 INTRODUCTION

This Construction Quality Assurance Plan (CQAP) has been prepared in conjunction with the 95% Remedial Design for the American Chemical Service (ACS) Superfund Site in Griffith, Indiana (Site) in accordance with the Statement of Work (SOW) in the United States Environmental Protection Agency (U.S. EPA) Record of Decision (ROD) issued to the ACS Remedial Design (RD)/Remedial Action (RA) Executive Committee on September 30, 1992 and the 1999 amended ROD. This CQAP addresses quality assurance activities that will be conducted to document RD conformance during the RA installation and construction at the Site. These activities include inspection, sampling and testing, corrective action, and documentation.

1.1 REPORT PRESENTATION

The report is presented in the following six sections:

- This section, Section 1, presents the purpose of the CQAP and its organization;
- Section 2 summarizes the project description and provides the project objectives and scope;
- Section 3 presents the overall project organization and responsibilities;
- Section 4 summarizes the construction quality assurance activities to document RD conformance during the RA installation and construction;
- Section 5 presents inspection activities to be performed prior to, during, and following the RA installation and construction; and
- Section 6 presents the protocols for reporting and documentation during the RA installation and construction.

2.0 PROJECT DESCRIPTION

2.1 SITE DESCRIPTION

Colfax Avenue, as shown on Figure 1, borders the Site on the east and northeast. An abandoned leg of the Chesapeake and Ohio Railway bisects the Site in a northwest-southeast direction, between the fenced ACS, Inc. operating facility (north) and the fenced Off-Site Containment Area (south). ACS, Inc. now owns these tracks and operates them strictly for holding and switching tank cars. The Site is bordered on the south by the Griffith Municipal Landfill (closed) and the abandoned Erie and Lackawanna Railroad right of way. On the north, the Site is bordered by the Grand Trunk Railroad and to the west by a wetland area.

The Site encompasses approximately 33 acres. The On-Site Area (ACS, Inc. operating facility) covers 15 acres and the Off-Site Containment Area and Kapica-Pazmey Area (at the southern end of the Site, where a former drum recycler was located) covers 13 acres. The wetlands to the west of the Site make up approximately 5 acres.

2.2 PROJECT OBJECTIVES AND SCOPE

The Final Remedy has the following elements: 1) source (mass) reduction, 2) treatment of process wastes, and 3) containment of wastes. These elements are designed to eliminate contaminant migration from source areas and reduce potential human exposure to acceptable levels. The Final Remedy consists of:

- *In-situ* soil vapor extraction (ISVE) in the Still Bottoms Pond Area (*source reduction and prevention of vapor migration*),
- ISVE in the areas of volatile organic compound (VOC) impact in the Off-Site Containment Area (*source reduction and prevention of vapor migration*),
- ISVE in the Kapica-Pazmey Area (*source reduction and prevention of vapor migration*),
- Treatment of extracted vapor (*vapor control*),
- Installation of an engineered cover over the areas containing buried waste (*containment and prevention of direct contact with impacted soil and vapors*).

The Final Remedy also includes the expedited remedial action that currently contains the source area and groundwater, including the Perimeter Groundwater Containment System (PGCS), Barrier Wall Extraction System (BWES), and barrier wall. These will continue to operate as part of the Final Remedy. The following items will be conducted or continued in accordance with the ROD:

- Removal of the polychlorinated biphenyl (PCB)-impacted sediments in the wetlands area by excavating and disposing sediments off-site at a Toxic Substances Control Act (TSCA)-approved landfill or consolidating them at locations inside the barrier wall depending on contaminant concentrations, and in accordance with the April 1999 PCB-Impacted Soils Excavation Work Plan;
- Removal and off-site disposal of the intact drums in the On-Site Containment Area in accordance with the Agency-approved January 1999 Buried Drum Removal Plan as revised by the January 26, 1999 Montgomery Watson response to Agency comments;
- Continued groundwater pumping from the PGCS and BWES and treatment through the groundwater treatment plant (GWTP) in accordance with the performance standard verification plan (PSVP) for the groundwater treatment system;
- Active treatment and Monitored Natural Attenuation (MNA) for groundwater outside the barrier wall in North and South/Southeast areas;
- Long term groundwater monitoring, in accordance with the September 1997 Agency-approved Long-Term Groundwater Monitoring Program; and
- Private well sampling, in accordance with the Agency-approved September 1997 Long-Term Groundwater Monitoring Program.

The purpose of this CQAP is to document RD conformance during RA construction activities and all tasks associated with the RA activities, including site preparation, ISVE, capping, installation of the dewatering system, and the barrier wall extraction system upgrades.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

A project organization chart illustrating personnel primarily responsible for construction management and Construction Quality Assurance (CQA) functions is presented in Figure 2. Responsibilities and authority of key positions are presented below.

3.1 OWNER

The Owner is defined as all representatives (collectively) of the ACS RD/RA Executive Committee. The Owner may designate oversight personnel, as necessary, to coordinate daily activities during the RA. The designation of the Owner's representative is the direct responsibility of the ACS RD/RA Executive Committee.

The Owner or the Owner's designee is responsible for coordinating communications with the regulatory agencies and Project Manager. The Owner or the Owner's designee will be responsible for ensuring that the final designs are constructed in accordance with the design plans and specifications.

The Owner or Owner's designee is responsible for submitting required information to U.S. EPA and the Indiana Department of Environmental Management (IDEM). Submittals include:

- Design drawings, specifications, and subsequent modifications;
- Progress reports;
- Acceptance or corrective action reports; and
- Construction documentation reports.

A complete description of the required submittals is presented in Section 6.0.

3.2 PROJECT COORDINATOR (PC)

Joseph D. Adams, Jr. of Montgomery Watson will serve as the Project Coordinator. The PC is responsible for directing the work to be performed and to serve as the U.S. EPA Remedial Project Manager's (RPM) primary point of contact with the ACS RD/RA Executive Committee.

3.3 PROJECT MANAGER

Todd Lewis will serve as the Montgomery Watson Constructors, Inc. Project Manager. The Project Manager will be the primary contact person for correspondence between the Owner and Montgomery Watson, and will be responsible for the successful execution and completion of the RA.

Project responsibilities will include tracking progress of schedule and cost on a daily basis during the RA, coordinating Montgomery Watson personnel, and reviewing submittals to the U.S. EPA and IDEM. The Project Manager will be in regular contact with the U.S. EPA RPM and Owner regarding project status, potential schedule and cost impacts, and quality issues.

3.4 CONSTRUCTION QUALITY CONTROL (CQC) SYSTEM MANAGER/CONSTRUCTION MANAGER

The CQC System Manager/Construction Manager for Montgomery Watson is to be determined. This position reports directly to the Project Manager.

The primary responsibility of the CQC System Manager is to ensure that all inspections are completed and to give field approvals on behalf of Montgomery Watson. This includes:

- Checking material and equipment as it is delivered to the Site;
- Ensuring that tests are performed and results are reported as they are received;
- Performing and/or directing tests and inspections;
- Ensuring compliance with contract plans and specifications;
- Maintaining and submitting QC documentation on a daily basis; and
- Verifying that the work tasks specified in the Work Plan are completed.

The CQC System Manager will appoint RA Task Manager(s) to be responsible for specific QC duties, as needed, for the various remedial actions after the approval of the personnel by the Owner.

The Construction Manager will be responsible for implementing, executing, and completing the construction activities. The Construction Manager will provide guidance to the RA Task Manager(s) and construction subcontractors during implementation of the RD.

3.5 ENGINEERING MANAGER

Tom Blair, P.E. will serve as the Engineering Manager for Montgomery Watson. The Engineering Manager will report directly to the Project Manager.

The Engineering Manager will be responsible for interpretation of the Work Plan and Scope of Work after consulting with the Owner. The Engineering Manager will review shop drawing submittals, evaluate the effectiveness of the remedial actions, and coordinate subcontracts for surveying activities. The Engineering Manager will periodically review the project documentation as work progresses and will also oversee preparation of the Construction Completion Report.

3.6 QUALITY CONTROL (QC) TEAM

A QC Team has been developed that consists of Mike Basel (ISVE), Joe Willich (Constructability), Steve Roth (Covers/Grading), and Ron Schlicher (GWTP upgrades). The QC Team will be available to address QC issues related to their respective area of expertise. The QC Team will communicate directly with the Project Manager and will review applicable RA documents as required.

3.7 HEALTH AND SAFETY COORDINATOR

Brian Griesemer will serve as the Health and Safety Coordinator (HSC). The HSC or designee will verify implementation of the Site Safety Plan (SSP) during construction activities.

3.8 ON-SITE SAFETY OFFICER

Lee Orosz will serve as the On-Site Safety Officer (OSO). The OSO is responsible for ensuring that the construction activities are in compliance with the approved SSP. The OSO will hold periodic safety meetings and keep the field team members informed of site hazards. The OSO will report to the Project Manager.

3.9 RA Task Manager(s)

RA Task Manager(s) will be appointed for the various remedial actions, as needed. The RA Task Manager(s) will report directly to the Construction Manager.

Responsibilities of the RA Task Manager(s) include subcontractor coordination, communicating with the Construction Manager, completing documentation for construction activities, and performing testing and sampling.

3.10 SUBCONTRACTORS

All Montgomery Watson and subcontractor staff are responsible for complying with the construction documents, work plans, procedures, and instructions. The type of subcontractors to be used at the Site will include, but are not limited to, the following:

- Earthwork Subcontractor
- Geotechnical Laboratory
- Geosynthetic Manufacturer(s)
- Geosynthetic Installer(s)
- Metal Building Fabricator
- General Plumbers, Electricians, Utility Workers, Pipe Fitters

- Concrete Work Subcontractors
- Equipment Vendors
- Certified Analytical Laboratory
- Trenching Subcontractor
- Hazardous Waste Transporters and Disposal Facility

4.0 CONSTRUCTION QUALITY ASSURANCE ACTIVITIES

The RA will be implemented on a design-build basis. Therefore, detailed "means and methods" specification will not be used. However, all RA work will conform to the Agency-approved RD documents. Prior to beginning each component of the RA, detailed instructions that further detail the Agency-approved RD documents will be issued to the subcontractors for the respective RA component. These instructions will be used to control the implementation of the RA. These instructions will allow flexibility for field modifications during construction of the RA. Brief lists of the types of quality assurance requirements for each component are given below.

4.1 SIGNAGE, FENCING, AND GATES

4.1.1 Submittals

- Signage – Shop drawings
- Gates – Shop drawings
- Typical fence and fence corner construction – Shop drawings
- Installation Plan

4.1.2 Material Quality Confirmation

- Fence fabric
- Fabric ties
- Barbed wire
- Line posts
- Swing gate frames
- Concrete

4.1.3 Observation, Inspection, and Testing

- Line post – set plumb, spacing, parallel to ground slope, minimum distance into ground
- Gates and corner posts – set plumb, concrete foundation, concrete encasement, depth into ground
- Changes in fence line – greater than 15 degrees (horizontal angle) considered as corner, and corner posts are to be installed
- Bracing – at end, gate and corner posts - in both directions
- Horizontal brace rails - location
- Diagonal tension members - location
- Corner posts – will be installed in lieu of line posts at intervals not exceeding 500 feet and shall be braced horizontally in both directions.
- Chain link fabric – fastening procedure and location
- Encasement concrete – condition of surface, placement procedure, cure time

- Galvanized coating - repair

4.2 EROSION CONTROL

4.2.1 Submittals

- Erosion control fence – sample marked clearly showing manufacturer's name, and product identification
- Erosion control fence – manufacturer's product specification sheet and installation instructions
- Erosion control fence – certificate which states conformance with the detailed construction scope of work for this RA component.
- Installation instructions for erosion control material
- Installation plan, including delivery schedule

4.2.2 Material Quality Confirmation

- Material will meet design criteria listed in the detailed construction scope of work for this RA component.

4.2.3 Observation, Inspection, and Testing

- Installation – as indicated on construction drawings
- Maintenance – as needed

4.3 TEMPORARY ACCESS ROADS

4.3.1 Submittals

- Geotextile - sample marked clearly showing manufacturer's name, and product identification
- Geotextile - manufacturer's technical data and installation instructions
- Geotextile - certificate stating conformance with the detailed construction scope of work for this RA component.
- Gravel – sample, grain size distribution
- Installation plan

4.3.2 Material Quality Confirmation

- Geotextile – mass, thickness, apparent opening size, grab tensile strength, puncture strength, and as described in the detailed construction scope of work for this RA component.
- Gravel – grain size distribution meets criteria listed in the detailed construction scope of work for this RA component.

4.3.3 Observation, Inspection, and Testing

- Geotextile – installation as indicated on construction drawings, as recommended by manufacturer, and as described in the detailed construction scope of work for this RA component.
- Gravel – placed and compacted as recommended in the detailed construction scope of work for this RA component.

4.4 DRUM REMOVAL

The proposed drum removal in the defined areas will be conducted in accordance with the January 1999 Buried Drum Removal Plan, submitted under separate cover at the request of U.S. EPA.

4.5 CLAY PLACEMENT

4.5.1 Submittals

- Atterburg limits
- Particle size analysis, including % passing – 200 sieve
- Permeability
- Moisture/density relationship
- Source identification
- Sample
- Certified test reports and analysis certifying suitability
- Proposed haul routes
- Test Fill Plan and Construction Report – describing necessary changes to procedures used in the test fill to ensure quality construction of the cover
- Installation plan

4.5.2 Material Quality Confirmation

- On-site soil density testing shall be completed by a testing laboratory where soils or aggregate testing is specified. Testing will be in accordance with the requirements of the detailed construction scope of work for this RA component.
- Tests conducted prior to construction will demonstrate compliance with the soil and aggregate specifications prior to its use
- Clay shall be suitable, free from grass, roots, brush, other organic material, debris and refuse
- Clay shall be free from contamination, frozen material, and masses of unbroken earth having a maximum dimension greater than 2 inches.
- All material greater than two inches will be well rounded

4.5.3 Observation, Inspection, and Testing

- Lift size no larger than six inches
- Soil to be compacted to 95% of maximum dry density at optimum moisture content
- Field density in-place tests will be performed in accordance with the detailed construction scope of work for this RA component.
- Atterburg limits, particle size analysis
- Surveying of clay placement area

4.6 SEPARATION BARRIER WALL CONSTRUCTION

4.6.1 Submittals

- Source identification
- Sample
- Permeability
- Certified test reports and analysis certifying suitability
- Bentonite – manufacturers product specification sheet
- Additives – manufacturers product specification sheet
- Installation plan

4.6.2 Material Quality Confirmation

- On-site slurry density testing shall be completed by a testing laboratory when slurry testing is specified. Testing will be in accordance with the requirements of the detailed construction scope of work for this RA component. Tests conducted prior to construction will demonstrate compliance with the slurry specifications prior to its use.
- Slurry shall be suitable, free from grass, roots, brush, other organic material, debris and refuse
- Slurry shall be free from contamination and frozen material

4.6.3 Observation, Inspection, and Testing

- Permeability and density tests will be performed in accordance with the detailed construction scope of work for this RA component
- Surveying of separation barrier wall alignment
- Installation – as indicated on construction drawings
- Photo documentation

4.7 BARRIER WALL EXTRACTION SYSTEM UPGRADES

4.7.1 Submittals

- Pumps – manufacturer's product specification sheet
- Filter pack - particle size analysis
- Pipe - manufacturer's product specification sheet
- Geotextile – manufacturer's product specification sheet
- Manhole and covers – manufacturer's product specification sheet
- Installation plan

4.7.2 Material Quality Confirmation

- Filter pack - meet requirements and conditions of the particular fill for which it is to be used
- Pipe – strength of pipe, open area/linear foot
- Geotextile - mass, thickness, apparent opening size, grab tensile strength, puncture strength
- Pumps – will meet design criteria listed in the detailed construction scope of work for this RA component
- Manhole and covers – will meet design criteria listed in the detailed construction scope of work for this RA component

4.7.3 Observation, Inspection, and Testing

- Filter pack – placement
- Pipe – placement
- Verification that installation procedures have not damaged pipe
- Verification of depth of well
- Construction of clean outs
- Construction of manholes and covers
- Development of wells
- Survey indicating well alignment and location

4.8 AIR SPARGING POINTS

4.8.1 Submittals

- Certification that pipe, casing and screen are in compliance with the detailed construction scope for this work
- Monitoring Well Driller's license – issued by the State of Indiana and in compliance with Specification IC 25-39-3
- Installation diagrams
- Drilling logs
- Record of any corrective actions
- Survey notes and field book
- Decontamination procedure

4.8.2 Material Quality Confirmation

- Pipe, point casing, screen and vaults will meet design criteria in the detailed construction scope of work for this RA component

4.9.3 Observation, Inspection, and Testing

- Geologic logs – project name, boring identification number, location of boring, type of drill rig and name of drilling firm, date(s) borings were drilled, reference elevation, name of driller and signature of individual prepared log, nominal hole diameter, total depth of boring, drilling method, depth of each stratum change, Unified Soil Classification System (USCS) material description of each stratum, depth and quantity of drill fluid loss or lost circulation, depth to water – date and time measured
- Installation diagrams – project and site name; point identification number; name, address and license number of driller, and name and signature of individual preparing the diagram; date(s) of point installation, description of material from which the point is constructed; total depth of point; nominal hole diameter; depth to top and bottom of screen, and any tailpipe installed in the well; depth to top and bottom of any seals installed in the point boring, type of cement and bentonite used, mix ratios of grout, and quantities used; elevations of key features of the point; other pertinent construction details, point location in reference to the Site coordinate system; a brief stratigraphic log; static water level
- Field note book – date and personnel present; visitors to the site; activities performed; quantities of material used; weather conditions; problems encountered and remedies
- Discharge pipe and air supply pipes will be pressure tested

4.9 DUAL PHASE EXTRACTION WELLS

4.9.1 Submittals

- Certification that pipe, well casing, well screen and well vaults are in compliance with the State of Indiana Specification 310 IAC 16-8-3
- Filter pack – grain size analysis
- Monitoring Well Driller's license – issued by the State of Indiana and in compliance with Specification IC 25-39-3
- Installation diagrams
- Drilling logs
- Record of any corrective actions
- Survey notes and field book
- Pumps – manufacturer's product specification sheet
- Decontamination procedure

4.9.2 Material Quality Confirmation

- Pipe, well casing, well screen and well vaults will meet design criteria in the detailed construction scope of work for this RA component
- Filter pack - meet requirements and conditions of the particular fill for which it is to be used
- Pumps – meet design criteria in the detailed construction scope of work for this RA component.

4.9.3 Observation, Inspection, and Testing

- Geologic logs – project name, boring identification number, location of boring, type of drill rig and name of drilling firm, date(s) borings were drilled, reference elevation, name of driller and signature of individual prepared log, nominal hole diameter, total depth of boring, drilling method, depth of each stratum change, Unified Soil Classification System (USCS) material description of each stratum, depth and quantity of drill fluid loss or lost circulation, depth to water – date and time measured
- Installation diagrams – project and site name; well identification number; name, address and license number of driller, and name and signature of individual preparing the diagram; date(s) of well installation, description of material from which the well is constructed; total depth of well; nominal hole diameter; depth to top and bottom of screen, filter pack, and any tailpipe installed in the well; depth to top and bottom of any seals installed in the well boring, type of cement and bentonite used, mix ratios of grout, and quantities used; elevations of key features of the well; other pertinent construction details, well location in reference to the Site coordinate system; a brief stratigraphic log; static water level
- Field note book – date and personnel present; visitors to the site; activities performed; quantities of material used; weather conditions; problems encountered and remedies

- Discharge pipe and air supply pipes will be pressure tested

4.10 IN-SITU VAPOR EXTRACTION (ISVE) SYSTEM – WELL INSTALLATION

4.10.1 Submittals

- Certification that pipe, well casing, well screen and well vaults are in compliance with the State of Indiana Specification 310 IAC 16-8-3
- Filter pack – grain size analysis
- Monitoring Well Driller's license – issued by the State of Indiana and in compliance with Specification IC 25-39-3
- Installation diagrams
- Drilling logs
- Record of any corrective actions
- Survey notes and field book
- Pumps – manufacturer's product specification sheet
- Decontamination procedure

4.10.2 Material Quality Confirmation

- Pipe, well casing, well screen and well vaults will meet design criteria in the detailed construction scope of work for this RA component
- Filter pack - meet requirements and conditions of the particular fill for which it is to be used
- Pumps – meet design criteria in the detailed construction scope of work for this RA component.

4.10.3 Observation, Inspection, and Testing

- Geologic logs – project name, boring identification number, location of boring, type of drill rig and name of drilling firm, date(s) borings were drilled, reference elevation, name of driller and signature of individual prepared log, nominal hole diameter, total depth of boring, drilling method, depth of each stratum change, USCS material description of each stratum, depth and quantity of drill fluid loss of lost circulation, depth to water – date and time measured
- Installation diagrams – project and site name; well identification number; name, address and license number of driller, and name and signature of individual preparing the diagram; date(s) of well installation, description of material from which the well is constructed; total depth of well; nominal hole diameter; depth to top and bottom of screen, filter pack, and any tailpipe installed in the well; depth to top and bottom of any seals installed in the well boring, type of cement and bentonite used, mix ratios of grout, and quantities used; elevations of key features of the well; other pertinent construction details, well location in reference to the Site coordinate system; a brief stratigraphic log; static water level

- Field note book – date and personnel present; visitors to the site; activities performed; quantities of material used; weather conditions; problems encountered and remedies
- Discharge pipe and air supply pipes will be pressure tested

4.11 ISVE – TRENCHING AND PIPING

4.11.1 Submittals

- Shop drawings – pipe, fittings, connections, valves, joining systems and appurtenances
- Pipe bedding – grain size analysis
- 48-hour advanced written notice of proposed testing schedule and testing plan
- Installation plan

4.11.2 Material Quality Confirmation

- Pipe bedding - meet requirements and conditions of the particular fill for which it is to be used
- Pipe, fittings, connections, valves, joining systems and appurtenances will meet design criteria in the detailed construction scope of work for this RA component
- Pipe alignment
- Pipe grades
- Backfill – meet requirements and conditions of the particular fill for which it is to be used

4.11.3 Observation, Inspection, and Testing

- All pipeline testing shall be tested for exfiltration as specified in the detailed construction scope of work for this RA component.
- Pipe joints, fittings - bonding
- Pipe laying, jointing, and testing for defects and leakage will be tested in the presence of the Construction Manager
- All pipe trenches will be partially backfilled prior to testing
- Pipe alignment
- Pipe grades
- Pipe bedding – even distribution, placed as designated in the detailed construction scope of work for this RA component.
- Backfill – placed as designated in the detailed construction scope of work for this RA component.

4.12 ISVE – MECHANICAL

4.12.1 Submittals

- Pumps – manufacturer's product specification sheet
- Blowers – manufacturer's product specification sheet
- Header pipe joints – manufacturer's product specification sheet
- Installation Plan

4.12.2 Material Quality Confirmation

- Mechanical and electrical components will meet design criteria in the detailed construction scope of work for this RA component

4.12.3 Observation, Inspection, and Testing

- Nondestructive testing of header pipe joints
- Blower will be tested for vacuum and pressure
- Pumps will be tested as indicated by the detailed construction scope of work for this RA component.
- Instrument control and electrical testing

4.13 INTERIM COVER - FLEXIBLE MEMBRANE LINER (FML)

4.13.1 Submittals

- Manufacturer's certified raw material and sheet material data sheets along with a copy of quality control certificates
- Manufacturer's product specification sheet a minimum 30 days prior to delivery of FML to the site
- Panel layout and penetration detail drawings a minimum of 30 days prior to delivery of FML to the site
- Manufacturer's, fabricator's and installer's quality control manuals
- Qualification statements from manufacturer, fabricator installer and independent laboratory
- Certified test results on factory seams prior to delivery of panels
- Written warranty from the manufacturer and installer
- Certified results of quality control test from the manufacturer, fabricator, and installer
- Sample – 12 inch by 12 inch
- Installation plan

4.13.2 Material Quality Confirmation

- Thickness
- Tensile strength at break
- Tear resistance
- Puncture resistance
- Impact strength
- Seam shear strength
- Seam peel adhesion

4.13.3 Observation, Inspection, and Testing

- Surface preparation
- Deployment
- Seaming
- Field sampling and testing
- Repairs
- Penetrations

4.14 INTERIM COVER – GEOTEXTILE

4.14.1 Submittals

- Sample
- Manufacturer's certificate of compliance
- Installation plan

4.14.2 Material Quality Confirmation

- Mass
- Thickness
- Apparent opening size
- Grab tensile strength
- Puncture strength

4.14.3 Observation, Inspection, and Testing

- Installation - as indicated on construction drawings, as recommended by the manufacturer

4.15 INTERIM COVER – FILL MATERIAL

4.15.1 Submittals

- Atterburg limits
- Particle size analysis
- Permeability
- Hydrometer analysis
- Moisture/density relationship
- Source
- Certified test reports and analysis certifying suitability
- Proposed haul routes
- Test fill plan
- Installation Plan

4.15.2 Material Quality Confirmation

- On-site soil density testing shall be completed by a testing laboratory where soils or aggregate testing is specified. Testing will be in accordance with the requirements of the detailed construction scope of work for this RA component
- Tests conducted prior to construction will demonstrate compliance with the soil and aggregate specifications prior to its use
- Fill material will be suitable, free from grass, roots, brush, other organic material, debris and refuse
- Material will be free from contamination, frozen material

4.15.3 Observation, Inspection, and Testing

- Lift size
- Soil to be compacted to 95% of maximum dry density at optimum moisture content
- Field density in-place tests will be performed in accordance with the detailed construction scope of work for this RA component
- Atterburg limits, particle size analysis
- Surveying material placement area

4.16 MATERIAL CONSOLIDATION – DRUM EXCAVATION AREA

Refer to the January 1999 Buried Drum Removal Plan.

4.16.1 Submittals

- Plan detailing proposed method for collecting and containerizing liquids generated during waste consolidation activities

- Plan detailing methods to be employed to prevent waste and debris from spreading uncontrolled beyond the limits of the waste consolidation area
- Removal plan

4.16.2 Material Quality Confirmation

- Material used during removal shall meet design criteria in the detailed construction scope of work for this RA component

4.16.3 Observation, Inspection and Testing

- Conducted in accordance with the Waste Consolidation performance specification
- Photo documentation – excavation and consolidation area
- Visual observation of removal areas
- Volumetric estimation
- Survey
- Regraded surface - free of depressions and protrusions

4.17 MATERIAL CONSOLIDATION – PCB-IMPACTED SEDIMENT

Refer to the April 1999 PCB-Impacted Soils Excavation Work Plan.

4.17.1 Submittals

- Removal plan

4.17.2 Material Quality Confirmation

- Material used during removal shall meet design criteria in the detailed construction scope of work for this RA component

4.17.3 Observation, Inspection and Testing

- Staking of removal areas
- Photo documentation – excavation and consolidation area
- Visual observation of removal areas
- Volumetric estimation
- Survey

4.18 MATERIAL CONSOLIDATION – OFF-SITE CONTAINMENT AREA SPOIL PILES

4.18.1 Submittals

- Removal plan

4.18.2 Material Quality Confirmation

- Material used during removal shall meet design criteria in the detailed construction scope of work for this RA component

4.18.3 Observation, Inspection and Testing

- Staking of removal areas
- Photo documentation – excavation and consolidation area
- Visual observation of removal areas
- Volumetric estimation
- Survey

4.19 STILL BOTTOMS POND AREA-CAP GRADING

4.19.1 Submittals

- Atterburg limits
- Particle size analysis
- Hydrometer analysis
- Moisture/density relationship
- Grading plan

4.19.2 Material Quality Confirmation

- On-site soil will be tested using a laboratory when soils or aggregate testing is specified. Testing will be in accordance with the requirements of the detailed construction scope of work for this RA component
- Tests conducted prior to construction will demonstrate compliance with the soil and aggregate specifications prior to its use
- Fill material will be suitable, free from grass, roots, brush, other organic material, debris and refuse
- Material will be free from contamination, frozen material

4.19.3 Observation, Inspection, and Testing

- Lift size
- Soil to be compacted to 95% of maximum dry density at optimum moisture content
- Field density in-place tests will be performed in accordance with the detailed construction scope of work for this RA component
- Atterburg limits, particle size analysis
- Surveying material placement area to verify grades and thicknesses

4.20 PERMANENT ACCESS ROADS

4.20.1 Submittals

- Geotextile - sample, certificate of compliance
- Gravel – sample, grain size distribution
- Installation plan

4.20.2 Material Quality Confirmation

- Geotextile – mass, thickness, apparent opening size, grab tensile strength, puncture strength
- Gravel – meet design criteria in the detailed construction scope of work for this RA component

4.20.3 Observation, Inspection, and Testing

- Geotextile – installation as indicated on construction drawings, as recommended by manufacturer
- Gravel – compacted as specified in the detailed construction scope of work for this RA component

4.21 PERMANENT COVER

4.21.1 Submittals

- Asphalt – Marshall analysis, grain size analysis, permeability
- Topsoil – Atterburg limits, particle size analysis and sample, certificate of compliance, pH, chemical analysis, and mechanical analysis
- Lime - certificate of compliance, calcium carbonate equivalence, sieve analysis
- Fertilizer- certificate of compliance
- Straw- certificate of compliance
- Hay- certificate of compliance

- Seed - certificate of compliance, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, date tested, and state certification
- List of seeding and mulching equipment

4.21.2 Material Quality Confirmation

- Asphalt – meet design criteria in the detailed construction scope of work for this RA component including permeability requirements.
- Topsoil – meet design criteria in the detailed construction scope of work for this RA component.
- Amendments – lime, fertilizer
- Mulch – straw, hay
- Seed – seed classification, seed mixtures, quality, seed mixing, commercial seed formula, inoculating legume seed

4.21.3 Observation, Inspection, and Testing

- Survey indicating final grade verification
- Asphalt – sample cores, in-place density testing, thickness verification
- Seeding times and conditions – field seed, environmental conditions
- Tillage – minimum depth
- Applications of soil amendments – soil test, application rates, lime fertilizer
- Seeding – equipment, seed application, hydroseeding, mulching.

5.0 INSPECTION ACTIVITIES

5.1 PRECONSTRUCTION CHECKLIST ITEMS

Each of the following items must be completed prior to commencing fieldwork:

- Montgomery Watson will make provisions to acquire the required permits or approvals for the construction activities;
- Review of the Health and Safety Plan and worker training status;
- Identification of all project team members and listing of 24-hour telephone numbers;
- Identification of site access/restrictions;
- Verification of availability and location of utilities;
- Finalization and approval of the project schedule; and
- Confirmation that subcontractors (such as the analytical laboratory and excavation subcontractor) are ready, subcontracts are signed, and insurance provided.

Additional information on several of the checklist items is presented below.

5.1.1 Site Access and Restrictions

The construction activities will be coordinated in advance with the appropriate point of contact for the ACS facility. Montgomery Watson will provide notification for all work planned at the Site and identify issues affecting the performance of work at the ACS facility.

5.1.2 Availability of Utilities

ACS and the local utility companies will provide potable water, sewer, gas, and electric service. However, Montgomery Watson will arrange for utility connections. Locations of underground utilities that may affect the excavation will be checked.

5.2 PRECONSTRUCTION MEETING

A preconstruction meeting will be held at the Site prior to beginning construction activities. The preconstruction meeting will be attended by the Owner, Project Manager, Engineering Manager, CQC System Manager/Construction Manager, appropriate subcontractors, and U.S. EPA and IDEM representatives. This CQAP will be reviewed, with specific focus on methods for documenting and reporting inspection data and methods for distributing and storing documents and reports. The responsibility of each party will be reviewed and clearly understood, and work area security and safety protocol will be reviewed. A Site walk-through will be conducted to verify that the design criteria, plans and specifications are understood and to review material and equipment storage locations. The Engineering Manager will document the meeting, and minutes will be transmitted to all participants.

5.3 CONSTRUCTION-PHASE QUALITY ASSURANCE

5.3.1 Purpose and Scope

This section presents the specific construction phase quality assurance activities for the ACS Site.

5.3.2 Meeting Requirements

Construction Progress Meetings will be held on a weekly basis and chaired by the Construction Manager. The primary subcontractors must send an authorized representative to each meeting.

RPM meetings will be held as required and chaired by the U.S. EPA or their designated representative. Montgomery Watson will attend all RPM meetings during the course of this contract. Subcontractors will not be required to attend these meetings, unless requested by the Owner or Montgomery Watson. The intent of the meetings will be to provide the RPM with a progress update and to work through any regulatory-related issues that might hold up the progress of the work.

5.4 INSPECTION AND OBSERVATION

5.4.1 Construction Progress and Conformance Inspections

The construction-phase inspection includes receiving inspections and in-progress inspections.

5.4.1.1 Receiving Inspections

The CQC System Manager/Construction Manager or designated representative(s) will perform receiving inspections for equipment and materials. The following receiving inspections are required:

- Mechanical equipment, including the treatment system components and piping, will be checked and documented by the Construction Manager;
- Metal building components will be checked and documented by the Construction Manager; and
- Inspection and laboratory sampling of import backfill materials for foreign or objectionable materials will be performed and verified by the CQC System Manager/Construction Manager.

5.4.1.2 In-Progress Inspections

Regular in-progress inspections will be conducted to verify compliance with the contract documents. Inspections will be performed by the Construction Manager and include the following:

- Overseeing the trenching subcontractor to confirm that the trench is being constructed in accordance with the drawings and specifications and that actual construction is being correctly documented;

- Ensuring that the subcontractor is taking appropriate measures to control and minimize dust emissions and erosion at the Site related to the subcontractor's work activities;
- Ensuring that trucks and equipment are properly decontaminated, and decontamination water and residuals are properly managed and disposed;
- Ensuring that security measures are being followed including entry by authorized persons only, use of appropriate personnel protection equipment, protection of ACS-owned property, and locks and other measures to prevent unauthorized entry when the work site is unmanned;
- Ensuring the use of effective barricade and other temporary controls to prevent impacted stormwater runoff and construction-related runoff; and
- Conduct compaction and relative density testing of compacted backfill to ensure that the specified percent compaction is achieved.

5.5 HEALTH AND SAFETY COMPLIANCE INSPECTIONS

For the ACS Site work, the Construction Manager will conduct periodic health and safety inspections in accordance with the SSP.

5.6 PREFINAL INSPECTION

Within fifteen (15) days after completion of construction, a prefinal inspection meeting will be held at the Site. The prefinal inspection will be attended by representatives of the Owner, the Project Coordinator, the Project Manager, the Engineering Manager, the CQC System Manager/Construction Manager, appropriate subcontractors, and U.S. EPA and IDEM representatives. The prefinal inspection will consist of a walk-through inspection of the entire project area. The prefinal inspection will determine whether the project is completed and consistent with the contract documents and the remedial work plan. Any outstanding construction items noted during the prefinal inspection will be recorded. A prefinal inspection report will outline the outstanding construction items, actions required to resolve items, completion dates for these items, and the date for the final inspection.

5.7 FINAL INSPECTION

Within twenty (20) working days after completion of any outstanding construction items as listed in the prefinal inspection report, a final inspection meeting will be held at the Site. The final inspection will be attended by representatives of the Owner, the Project Coordinator, the Project Manager, the Engineering Manager, the CQC System Manager/Construction Manager, appropriate subcontractors, and U.S. EPA and IDEM representatives. The final inspection will consist of a walk-through inspection of the project site. The prefinal inspection report will be used as a checklist, and the final inspection will focus on the outstanding construction items. The final inspection will confirm to U.S. EPA and IDEM that outstanding items have been resolved.

6.0 REPORTING AND DOCUMENTATION

6.1 DAILY REPORTS

Daily construction reports will be prepared by the Construction Manager to document the activities performed on-site. Daily construction reports must include:

- Observation and Testing Data Sheets;
- Discussions between the Project Manager, CQC System Manager/Construction Manager, and subcontractors; and
- Documentation of construction problems and resolutions.

6.1.1 Observation and Testing Data Sheets

Observation and testing data sheets will be prepared daily. The geosynthetic subcontractor will supply FML testing forms. Data sheets will include the following information, as appropriate:

- Weather conditions;
- Name of each subcontractor on the job that day, including number of manual workers by craft and names of non-manual workers (supervisors) at the Site;
- List name, employer, and time in and out of any visitors to the Site;
- List identity, size and type of all major pieces of equipment at the Site each day. Indicate if idle, and reason, if applicable;
- Log status of all work started and in progress, including the entity performing the work;
- Type and quantity of materials delivered to the Site;
- List of any samples collected and tests performed;
- Record of movement of major construction equipment to and from the Site;
- Reference any quality deficiencies or unsafe conditions, and actions taken to correct the same;
- List of all tests performed at the Site. The lab making the test should report results. Note the location of the test and the report number; and
- Signatures of person preparing the report, including full name, title, and date.

Photographs of the construction activities will be cross-referenced with observation and testing information. The photographs will serve as a pictorial record of work progress, problems, and mitigation activities. The basic file will contain color prints. Negatives will be stored in a separate file.

6.1.2 Discussions Regarding Revisions or Changes to Work

A memorandum will be prepared summarizing discussions whenever a significant revision or change to the work is discussed. At a minimum, the memorandum will include the following information:

- Date, project name, location, and other project related identification;
- Name of parties involved in discussion;
- Relevant subject matter or issues;
- Activities planned;
- Constraints and/or suggestions;
- Schedule impacts; and
- Signature of CQC System Manager/Construction Manager.

6.1.3 Construction Problems and Resolutions

Advisory Notices describing special construction situations will be cross-referenced with specific observation and testing data sheets, and will include the following information:

- An identifying sheet number for cross referencing and document control;
- A detailed description of the situation or deficiency ;
- The location and probable cause of the situation or deficiency;
- How and when the situation or deficiency was found or located;
- Documentation of the response to the situation or deficiency;
- Final results of any response;
- Any measures taken to prevent a similar situation from occurring in the future; and
- Signature of the CQA System Manager.

6.2 FIELD TESTING REPORTS

The CQC System Manager/Construction Manager will manage records of field and laboratory testing performed at the Site. A summary list of test results will be prepared by the CQC System Manager/Construction Manager on an ongoing basis, and submitted to the Engineering Manager.

6.3 PROGRESS REPORTS

The ACS RD/RA Executive Committee will submit to the U.S. EPA signed monthly reports during the construction phase. These progress reports will include, as a minimum (and as appropriate):

- A description and estimate of the percentage of the RA work completed;
- Summary of findings;
- Summary of changes made in the RA from the original plan during the reporting period;

- Summaries of contacts with representatives of the local community, public interest groups, or State government during the reporting period;
- Summary of problems or potential problems encountered during the reporting period, and actions being taken to address these problems;
- Changes in key personnel during the reporting period;
- Projected work activities for the next reporting period;
- Copies of daily reports, inspection reports, and laboratory/monitoring data;
- Comparison of working schedule to project schedule;
- Summaries of conference calls and meetings held during the reporting period between the Owner and the U.S. EPA; and
- Copies of contractor progress reports prepared by Montgomery Watson.

6.4 INSPECTION REPORTS

Inspection reports will be completed after each of the required inspections has occurred to document the inspections. Documentation of the inspections will be prepared and will be issued to all participants in the inspection meeting.

6.5 COMPLETION REPORTS

6.5.1 Construction Completion Report

Within thirty (30) days of the final inspection, a Construction Completion Report will be prepared and submitted to the Owner for submittal to U.S. EPA and IDEM. The Construction Completion Report will confirm that the work has been performed in substantial compliance with the design plans and specifications. The Construction Completion Report will include the following:

- Summary of construction activities;
- Observation and Testing Data Sheets, including sampling locations;
- Construction problems and solutions;
- Photographic documentation;
- Changes from design and material specifications; and
- As-built drawings signed and stamped by a professional engineer.

6.5.2 As-Built Drawings

As-built drawings of the remedial action components will be prepared and included in the Construction Completion Report. At a minimum, the drawings will include the following:

- Measured grade of the finished surface of each soil component;
- Location of field tests and samples obtained for laboratory testing;
- Details;
- Limits of geotextile and any repairs; and
- Depth and alignment of ISVE wells.

6.5.3 Remedial Action Completion Report

Within sixty (60) days after startup of the ISVE system, a Remedial Action Completion Report will be prepared by Montgomery Watson and submitted to the Owner for submittal to U.S. EPA and IDEM. The RA Completion Report will confirm that the RA has been completed in full satisfaction of the requirements of the ROD.

6.5.4 Work Completion Report

Within ninety (90) days after U.S. EPA determines that operation and maintenance (O&M) is complete, the Owner will submit a Work Completion Report to U.S. EPA and IDEM. The Work Completion Report will confirm that the RA has been completed in full satisfaction of the requirements of the ROD.






6.6 FINAL STORAGE OF RECORDS

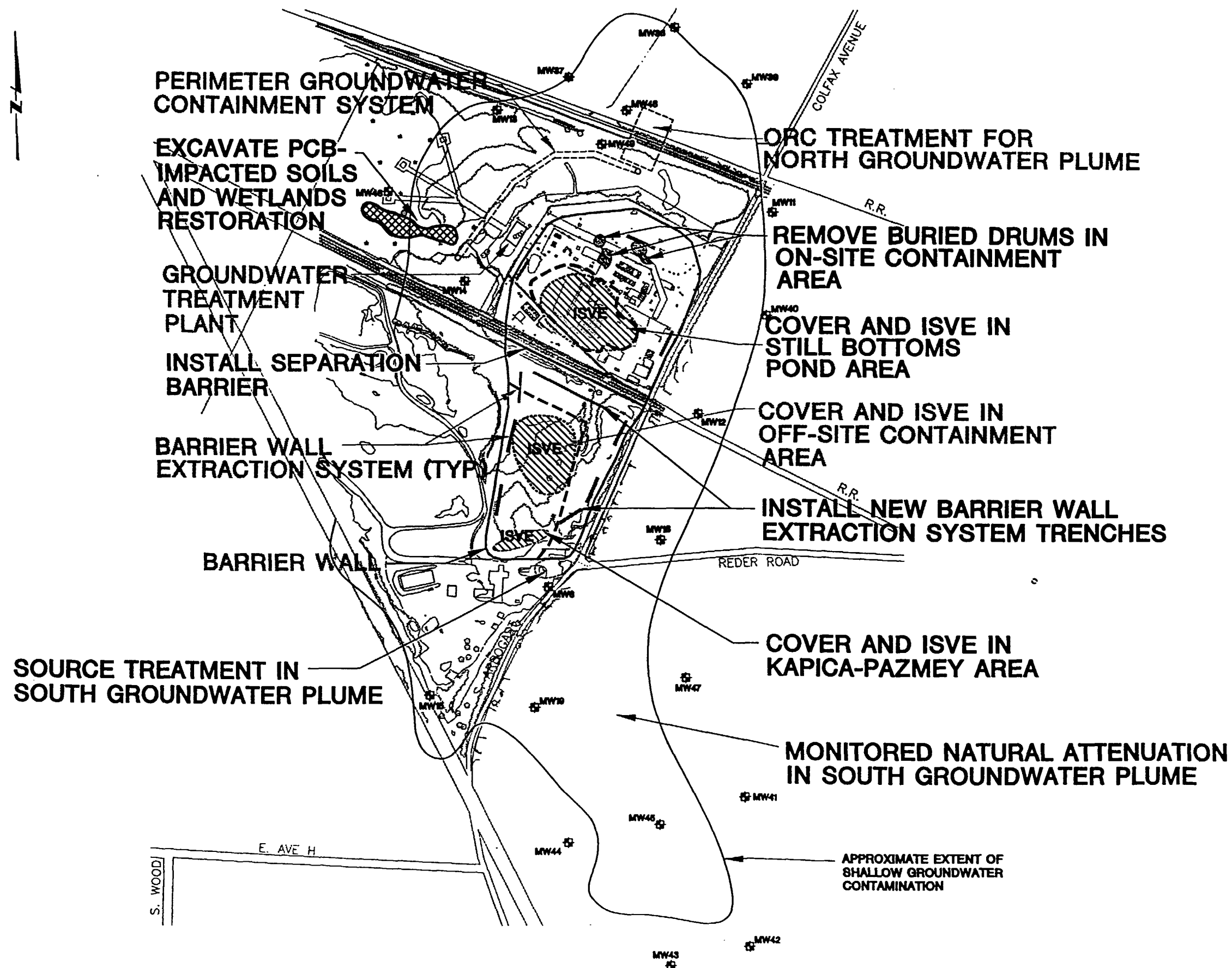
Final records of the construction of the ISVE system, capping activities, and GWTP update will be maintained in the Engineer's files. The Owner, U.S. EPA, and IDEM will retain copies of reports and other submittals.

JMS/jms/BSJ/bsj/TAB/PJV
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LEGEND

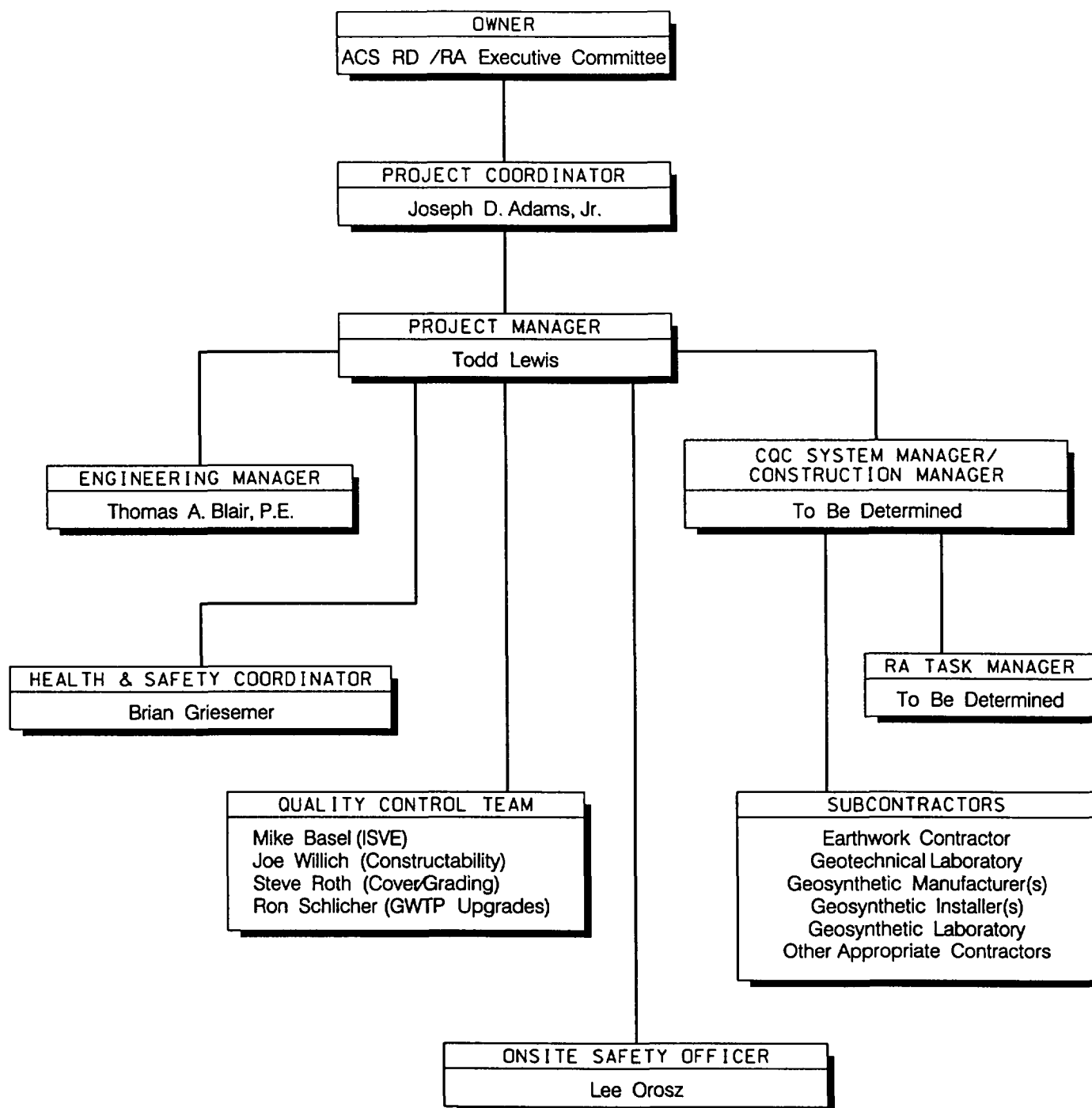
-  BARRIER WALL
-  PERIMETER GROUND WATER CONTAINMENT SYSTEM
-  AREA TO BE TREATED WITH ISVE
-  CAP BOUNDARY
-  MW41 MONITORING WELL



NOTE:
REMEDIAL ACTIONS PROPOSED ARE
BOLD TYPE FACE. EXISTING MEASURES
ARE SCREENED TYPE FACE.

Job No. MW Job # J/1252/042 drawings/chr/0428c11.dwg Plot Date: 0000000000 0000000000

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						DRAWN <u>RBA</u>		TOM BLAIR (PROJECT MANAGER)		IN-19600482 LICENSE NO.												DATE	
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MONTGOMERY WATSON
Chicago, Illinois

AMERICAN CHEMICAL SERVICE, INC.
NPL SITE
GRIFFITH, INDIANA

**CONSTRUCTION
MANAGEMENT ORGANIZATION**

FIGURE
2